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AP42 Section:	11.7
Background Chapter:	4
Reference:	33
Title:	<i>Hydrogen Cyanide Emission Testing, Foseco, Inc., Mt. Braddock Plant, Mt. Braddock, PA, Hemeon Associates, Inc., Pittsburgh, PA, April 16, 1990.</i>

Commonwealth of Pennsylvania
Environmental Resources
June 19, 1980

Subject: Source Test Review

To: Data File
FOSECO, Inc.
Mount Braddock, Fayette County

From: Thomas P. Blanka, ~~SEB~~
Air Pollution Control Engineer
Division of Technical Services and Monitoring
Bureau of Air Quality Control

Through: Chief, Source Testing and Monitoring Section ~~John~~

Not
Ceramics
Mfg.

FOSECO, Inc. operates a drying kiln at its facility in Mount Braddock, Fayette County. Alumina oxide, silicon dioxide and water are mixed to form a slurry. Urethane foam in one and one-half foot squares are dipped into the slurry. The coated foam then enters a drying kiln which is heated at a rate of 275°F per hour until the temperature reaches 752°F at which time the heating rate is slowed to 90°F per hour. The temperature rate is again raised to 275°F per hour until 2300°F is reached and held for two hours and then cooled at 400°F per hour to approximately 1800°F. The resulting ceramic blocks are then taken to a cooling area, allowed to cool overnight and then packaged for shipment. The effluent from the kiln is drawn to an afterburner operating at approximately 1,800°F by an induced draft fan rated at 2,100 acfm. From the afterburner, the effluent is exhausted to the atmosphere through a 19.5 inch I.D. stack having a discharge point approximately 23 feet above grade.

Hemcon Associates, Inc. conducted hydrogen cyanide emissions testing for compliance purposes in the stack serving the drying kiln. Mr. Dick Murray of the Greensburg District Office observed the testing program. The tests were conducted in accordance with the preapproved test protocol and are acceptable to the Department. The calculations are correct and the results appear to be valid.

The following was extracted from the test report:

Run No.	1	2	3
Kiln Temperature, °F	400-750	840-1020	2300
Hydrogen Cyanide Concentration, PPMV	0.450	0.028	ND
Hydrogen Cyanide Mass Emission Rate, lb/hr	0.004567	0.0002106	ND

ND = None Detected

- Data File
FOSSCO, Inc.
Mount Bradlock, Fayette County

- 2 -

June 19, 1990

cc: Joseph Penze, Pittsburgh Regional Office
Dick Murray, Greensburg District Office
20-309-043
EPA/RSL
Reading File
Doug Lesher

TPH:rlr



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HYDROGEN CYANIDE
EMISSION TESTING
POSCO, INC.
MT. BRADDOCK, PLANT
MT. BRADDOCK, PA

Report to:
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Report by:
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April 18, 1990

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1.0 INTRODUCTION

On April 11, 1980, the Hydrogen Cyanide emissions testing was conducted on the Kiln afterburner Stack (now unit No. 2) at Fosco, Inc.'s plant in Mt. Braddock, PA. The test program was authorized by Mr. Barry Bittner of Fosco, Inc. Testing was performed by Mr. John C. Parry and Mr. Russell Lantz of Homon Associates, Inc. Process coordination was provided by Mr. Orrin Clingan, Jr. of Fosco, Inc. Observing the testing was Mr. Dick Murray of the PA Department of Environmental Resources.

PURPOSE

The purpose of this compliance test program was to determine the Hydrogen Cyanide emissions from the Kiln Afterburner Stack and its compliance with the PA Department of environmental Resources.

2.0 SUMMARY OF RESULTS

Table No. 1 below represents the hydrogen cyanide emission results from testing the Afterburner Stack at Foraco, Inc.'s plant in Mt. Braddock, PA.

TABLE NO. 1

Hydrogen Cyanide Emission Results

Date 1990	Sample Location	Test No.	Hydrogen Cyanide Emission	
			PPM a	Measured lb/hr b
4-10-90	Afterburner Stack	1	0.450	0.004507
4-10-90	Afterburner Stack	2	0.020	0.0002106
4-10-90	Afterburner Stack	3	0.000	0.000000

a - Parts per million by volume

b - Pounds per hour.

Table No. 2 is a summary of the flue gas parameters.

Table No. 2
SUMMARY OF FLUE GAS PARAMETERS

FOSFLO

TEST NO.	1	2	3
TEST DATA			
Test Date	4/10/90	4/10/90	4/10/90
Static Press., in. WC	-1.56	-1.56	-1.56
Pitot Readings, rms	1.11	1.22	1.112
Gas Temp., deg. F	930	921	778
Fluometer Ave., "WC	1.04	1.22	.748
Gauometer Av. Temp., deg. F	71	68	76
Sampling Time, min.	120	60	120
Sample Vol., acf	70.65	35.527	60.692
Davco. Press., in. Hg	29.03	28.9	28.73
Condensate, ml	40	24	54
Davco. Gain, gms	16.7	5.5	12.7
GAS COMPOSITION			
CO ₂ , mole fraction	.015	.015	.015
O ₂ , mole fraction	.19	.19	.19
N ₂ , mole fraction	.795	.795	.795
AREAS			
Stack Diameter, in.	13.5	13.5	13.5
Stack Area, sq. ft.	.9940196	.9940196	.9940196
Nozzle Diameter, in.	.197	.197	.197
Nozz. Area, sq. ft.	.0002117	.0002117	.0002117
CALCULATED RESULTS			
Gas, Dry mol. wt.	29.01	29	29
Gas Dens., lb/cu ft	.075	.075	.075
Sample vol., dry acf	68.5	34.5	57.7
Gas samp., dry lbs	5.14	2.59	4.33
Water in Samp., lbs	.125	.065	.147
Water Cont. lbs/lb	.024	.025	.034
Water, volume %	3.8	3.9	5.2
Water, weight %	2.3	2.5	3.3
Gas Mol. Wt., Actual	28.59	28.57	28.43
Gas Dens. in stack	.0384	.0385	.0382
Stack Gas, acfm	4900	5200	5600
Stack Gas, lbs/hr	11300	12000	10100
St. Gas, lbs/hr dry	11000	11700	9600
St. Gas, acfm, dry	2440	2602	2180
Percent Isokinetic	109.9	103.9	103.6

3.0 PROCESS & TEST PROGRAM DESCRIPTION

PROCESS DESCRIPTION

Polyurethane foam impregnated with a slurry of ceramic material is fired in a kiln for 17 hours. The impregnated foam is subjected to a scheduled temperature increase which reaches a maximum temperature of 2300°F. The polyurethane foam is destroyed leaving a porous ceramic block which is used by Foseco's customers to filter molten aluminum.

The kiln is heated at 275°F per hour until the temperature reaches 652°F - 752°F. It is held at 2300°F for two hours and then cooled at 400°F per hour to approximately 1800°F.

Hydrogen cyanide is released from the foam at 400°F. The kiln is fired by 12 natural gas burners which have a maximum heating input of 3.5 million Btu/hr.

SAMPLING PROCEDURES

Sampling ports were provided at at least eight stack diameters above the draft damper as shown in Figure No. 1.

Samples were taken according to EPA Methods 1 and 2 along two axes of the stack at right angles to each other. EPA Methods 3 and 4 were used for the determination of gas composition and moisture. A Method 5 sampling train was used to perform isokinetic sampling. The impingers contained 0.1N KOH.

Sampling began when the kiln temperature reached 400°F. The first sample was taken for a 2 hour period. Due to severe weather conditions, the second sample was taken for a period of 1 hour beginning about 1 hour after the first sample was completed. The third sample was taken for 2 hours during the holding period after the kiln reached its maximum temperature of 2300°F.

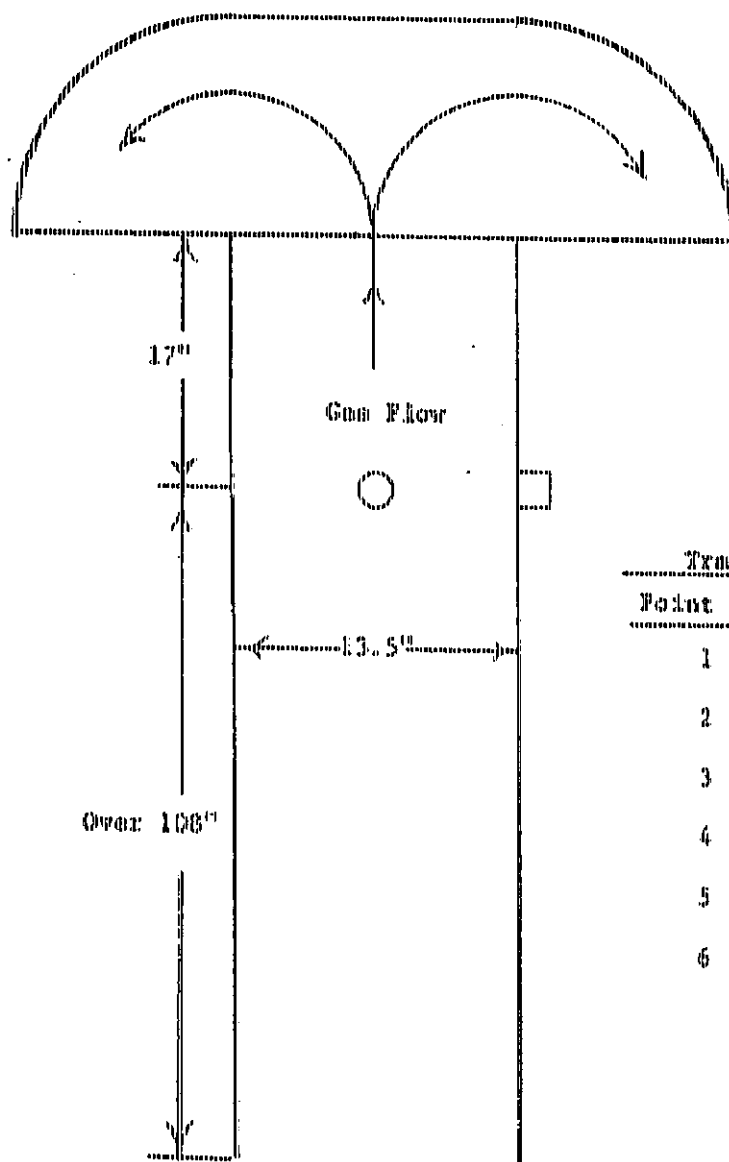
Because of the uncertainty that temperature can be sufficiently controlled to prevent a polymer filter from melting, all three tests were conducted without using a filter. The recovery of HCN was made from the sampling probe, the impingers and the desiccant.

A quartz probe was used for sampling. Velocity and temperature were measured at each sampling point in accordance with customary procedures for EPA Method 5. A minimum of 30 dry standard cubic feet was collected for each sample.

ANALYTICAL PROCEDURES

Analysis was performed by cyanide ion electrode according to procedures of NIOSH Method 7804.

A detailed procedure for EPA Method 5 is located in Appendix B.



2 Ports 90° Apart

6 Points Per Port

12 Points Total

Transverse Point Location

Point Number	Percent of Diameter
1	6.4
2	16.6
3	26.6
4	40.4
5	55.4
6	95.6

Figure No. 1

Kiln Afterburner Stack

New Unit No. 2

Pococo, Inc. - Mt. Braddock, PA

Homonan Associates, Inc. report of 0710/90
to Peaseco, Inc., Cleveland, Ohio

A. Formulas and Calculations

Kemco Associates, Inc.

Example Calculations for Particulate Emissions

Test No.

1. Volume of dry gas sampled corrected to standard conditions. Note: V_m must be corrected for leakage if any leakage rates exceed L_a .

$$V_{m, \text{std}} = 17.65 \times V_m \times \left[\frac{P}{\text{bar}} + \frac{\Delta H}{T_m} \right] =$$

2. Weight of water in flue gas sample (lbs.).

$$W_{Fg} = \frac{(\text{ml. condensate} + \text{grams dehydr. gain})}{453.6} =$$

3. Water vapor concentration (%).

$$W_{Fg} = \frac{\left(\frac{21.5}{21.5} \times \frac{W_{Fg}}{W_{Fg} + V_{m, \text{std}}} \right) \times 100}{100} =$$

4. Dry molecular weight of stack gas.

$$M_d = 0.44 (\% \text{ CO}_2) + 0.32 (\% \text{ O}_2) + 0.28 (\% \text{ N}_2 + \% \text{ CO}) =$$

5. Stack gas density (lbs./cuft).

$$D_g = \left(\frac{M_d}{29} \right) \times 0.0753 =$$

6. Stack gas density at stack conditions (lbs./ft.³).

$$D_{gs} = 0.0753 \times \left(\frac{M_d}{29} \right) \times \frac{P_s + 27.6}{29.92 \text{ in. Hg}} \times \left(\frac{528}{T_{gs}} \right) =$$

7. Molecular weight of stack gas.

$$M_g = M_d (1 - W_{Fg}) + 18 W_{Fg} =$$

8. Stack velocity at stack conditions, fpm.

$$V_g = 85.49 \text{ Cp} \sqrt{\Delta P} \text{ avg. } \sqrt{\frac{T_g}{P_g M_g}} =$$

9. Actual volumetric flow rate (ACFM).

$$Sf = \frac{1096.7 \times Cp \times \sqrt{VAP(RMS)} \times An}{\sqrt{Dgs}}$$

10. Stack weight flow at stack conditions (lbs./hr.).

$$Swf = Sf \times Dgs \times 60 =$$

11. Gas sample weight (lbs.).

$$Gsw = Vmtd \times Dg =$$

12. Humidity of flue gas (lbs. of H_2O /lbs. dry gas).

$$Hfg = \left(\frac{Wfg}{Gsw} \right) =$$

13. Stack weight flow on dry basis (lbs./hr.).

$$Swfd = \left(\frac{SWf}{1 + Hfg} \right)$$

14. Stack volumetric flow at standard conditions (SCFM).

$$Sfs = \left(\frac{SWfd}{60 \times Dg} \right) =$$

15. Isokinetic sampling rate (X).

$$X = \left(\frac{Vmtd \times As \times 100}{Sfs \times An \times 0} \right) =$$

16. Weight of particulate (10^{-3} lbs.).

$$Wp = (W_{gt. grams}) \times 2.2046 =$$

17. Pounds of particulate per 1000 lbs. of gas (lbs. part./1000 lbs. gas).

$$(Wp/G) = \left(\frac{Wp}{GVW} \right) =$$

Hammann Associates, Inc. report of 4/19/60
to Perco, Inc., Cleveland, Ohio

HCN Emission Calculations

PPM of HCN	"	mg of HCN 10 ³	"	24.5 M.W.
Tubes Nos. 1				
0.00	"	24.5	"	
1.040	"	27	"	0.456 PPM of HCN
Tubes Nos. 2				
0.03	"	24.5	"	
0.077	"	27	"	0.020 PPM of HCN
Tubes Nos. 3				
0.00	"	24.5	"	
1.034	"	27	"	0.000 PPM of HCN

Homon Associates, Inc. report of 4/18/60
to Posco, Inc., Cleveland, Ohio

B. Test Methodology

Hemphill Associates, Inc. report of 4/18/90
to Ponoco, Inc. Cleveland, Ohio

STACK GAS FLOW AND HCN EMISSIONS

Test No.	1	2	3
Date	4/10/90	4/10/90	4/10/90
Overall sampling period	7:50 AM 9:55 AM	10:55 AM 12:25 PM	3:30 PM 5:35 PM
Net sampling time, min.	120	60	120

STACK GAS

Temperature, deg. F	530	521	770
Flow rates			
Actual lbs/hr	11300	12000	10100
Dry basis lbs/hr	11000	11700	9800
Actm	4900	5200	3600
Scfm, dry	2440	2600	2100

PARTICULATE MATTER

Concentration			
Dry Basis			
Lbs dust per 1000000 lb gas	.417	.010	0
Grains per 1000 scf	.219	.009	0
DUST EMISSION RATE, lbs/hr	.004557	.0002106	0

Hemdon Associates, Inc. report of 4/18/80
to Posco, Inc., Cleveland, Ohio

DETERMINATION OF PARTICULATE EMISSIONS EPA METHOD 5

The following method was used in this test program. Sampling procedures follow those described in Method 5 of the Federal Register and Handbook of Environmental Engineering.

SAMPLING APPARATUS

The particulate sampling train used in these tests at the exit stack met certain design specifications established by the Federal EPA and was assembled by Hemdon personnel. It consisted of:

Sample - Stainless steel (316) with sharp, tapered leading edge and accurately measured round opening.

Probe - Glass lined with a heating system capable of maintaining a minimum gas temperature of 250°F at the exit and during sampling.

Pitot Tube - Type S pitot tube that met all geometry standards was used to monitor stack gas velocity.

Filter Holder - Pyrex glass with heating system capable of maintaining a filter temperature of approximately 250°F.

Level Gauge - An inclined manometer made by Dwyer with a readability of 0.01 inches H₂O in the 0-4 inch range was used.

Impingers - Four impingers connected in series with glass ball joints. The first, third and fourth impingers were of the Grossburg-Smith design, modified by replacing the tip with a 1/2 inch I.D. glass tube extending to 1/2 inch from the bottom of the flask.

Measuring System - Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 5°F, calibrated dry gas meter, and related equipment, to maintain an isokinetic sampling rate and to determine sample volume. The dry gas meter is made by Rockwell and the filter vacuum pump is made by Gast.

Barometer - Aneroid type to measure atmospheric pressures to ±0.1 inch Hg.

Federal Register, CFR 40, Part 60, July 1, 1987
EPA Source Testing Manual, January 1983

Hammann Associates, Inc. report of 4/18/90
to Peacock, Inc., Cleveland, Ohio

SAMPLING PROCEDURE - PARTICULATE

After selecting the sampling site and the minimum number of traverse points, the stack pressure, temperature, moisture and range of velocity head were measured according to the procedures described in the Handbook.

Approximately 200 grams of silica gel were weighed in a sealed impinger prior to each test. Silica gel impingers (4 inch diameter) were desiccated for at least 24 hours dried at 105°C for two hours and weighed to the nearest 0.1 mg on an analytical balance. One-hundred ml of distilled water was placed in each of the first two impingers; the third impinger was initially empty; and the impinger containing the silica gel was placed next in series. The train was set up with the probe as shown in Figure A-1. The sampling train was leak-checked at the sampling site prior to each test run by plugging the inlet to the nozzle and pulling a 15 inch Hg vacuum, and at the conclusion of the test by plugging the inlet to the nozzle and pulling a vacuum equal to the highest vacuum reached during the test run.

The pitot tube and lines were leak-checked at the test site prior to and following the initial velocity traverse. The check is made by blowing into the impact opening of the pitot tube until 3 or more inches of water are recorded on the manometer and then capping the impact opening and holding it for 15 seconds to assure it was leak free. The static pressure side of the pitot tube was leak-checked using the same procedure, except suction was used to obtain the 3 inch H₂O manometer reading. Crushed ice was placed around the impingers to keep the temperature of the gases leaving the last impinger at 68°F or less.

During sampling, stack gas and sampling train data was recorded at each sampling point and when significant changes in stack flow conditions occurred. Isokinetic sampling rates were not throughout the sampling period with the aid of isokinetic sampling equations. All sampling data was recorded on the Particulate Field Data Sheet.

FFederal Register, CFR 40, Part 60, July 1, 1988
FFlow fiber filters, Type 934 AH

Hummer Associates, Inc. report of 4/18/80
to Peroco, Inc., Cleveland, Ohio

SAMPLE RECOVERY PROCEDURES

The sampling train was moved carefully from the test site to the cleanup area. Samples of the acetone and distilled water used in the sample recovery were taken for use as blanks. The volume of water from the first three impingers were measured. Sample fractions were recovered as follows:

Container No. 1 - The filter was removed from its holder and placed in a petri dish and sealed.

Container No. 2 - Loose particulate and water washings from all sample-exposed surface prior to the filter were placed in a sample container, sealed and labeled. Particulate was removed from the probe with the aid of a brush and distilled water rinsing. The liquid level was marked after the container was sealed.

Container No. 3 - Loose particulate and acetone washings from all sample-exposed surface prior to the filter were placed in a sample container, sealed and labeled. Particulate was removed from the probe with the aid of a brush and acetone rinsing. The liquid level was marked after the container was sealed.

Container No. 4 - A minimum of 200 ml of acetone was taken for the blank analysis. The blank was obtained and treated in a similar manner as the acetone washing.

Container No. 5 - Distilled water in the impinger section of the sampling train was placed in a sample container. The impingers and connecting glassware will be rinsed with distilled H₂O and this rinse added to the container for shipment to the laboratory.

Container No. 6 - Acetone washings from all sample-exposed surfaces in the impingers were placed in a sample container, labeled and sealed. The liquid level was marked after the container was sealed.

Container No. 7 - A minimum of 200 ml of distilled water was taken for the blank analysis. The blank was obtained and treated in a similar manner as the water rinse.

The silica gel from the fourth impinger was weighed and the gain recorded on the Sample Recovery Data Sheet with other pertinent data.

Johnson Associates, Inc. report of 4/21/50
to Pence, Inc., Cleveland, Ohio

ANALYTICAL PROCEDURES

The following procedures will be used and follow the method prescribed by the Department of Environmental Protection.

Container No. 1 - The filter and any loose particulate matter from this sample container were placed into a tared glass weighing dish, desiccated for 24 hours to a constant weight and weighed to the nearest 0.1 mg.

Container No. 2 - The distilled water washings were transferred to a tared beaker and evaporated to dryness at 105°C temperature and pressure, desiccated for 24 hours to a constant weight and weighed to the nearest 0.1 mg.

Container No. 3 - The acetone washings were transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure, dedicated for 24 hours to a constant weight and weighed to the nearest 0.1 mg.

Container No. 4 - The acetone blank was transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure. The blank was then be desiccated for 24 hours to a constant weight and weighed to the nearest 0.1 mg.

Container No. 5 - The contents of this container were filtered through tared (0.6u - 0.22u) filters to remove insoluble particulate. The filters and filtrates were put in tared beakers, evaporated to dryness at 105°C, desiccated to a constant weight and weighed on an analytical balance to the nearest 0.1 mg.

Container No. 4 - The contents of this container were evaporated to dryness at ambient temperature and pressure, dissolved to a constant weight and weighed on an analytical balance to the nearest 0.1 mg.

Container No. 7 - The distilled water blank was transferred to a tared beaker and evaporated to dryness at 105°C. The blank was then desiccated to a constant weight and weighed on an analytical balance to the nearest 0.1 mg.

The term "constant weight" means a difference of no more than 0.5 mg or 1% of total weight loss two weight, whichever is greater between two consecutive readings, with no less than 6 hours of desiccation between weighings.

Homon Association, Inc. report of 4/18/80
to Posco, Inc., Cleveland, Ohio

C. Field Data Sheet

DRY GAS METER CALIBRATION DATA FORM

Test number

Date 15 Mar 50 Meter box number RAK 1512 Name

Barometric pressure, $P_b = 29.27$ in. Hg Dry gas meter number 201009 Pretest $V = 1.009$

Orifice manometer reading, (AW), in. H ₂ O	Gas volume		Temperature			Time (θ), min.	Vacuum setting, in. Hg	V_1	$V_2 P_2 (t_2 + 460)$ $V_1 P_1 (t_1 + 460)$ 13.6
	Wet test meter (V_1), ft ³	Dry gas meter (V_2), ft ³	Wet test meter (t_1), °F	Inlet (t_1), °F	Outlet (t_2), °F				
20	10.010	10.555	74	145	98	110.5	2.4	1009	
20	10.017	10.414	74	146	98	112	2.4	1007	
20	10.016	10.349	74	147	100	113.5	2.4	1006	
								$V = 1.007$	

a If there is only one thermometer on the dry gas meter, record the temperature under t_1 .

V_1 = Gas volume passing through the wet test meter, ft³

V_2 = Gas volume passing through the dry gas meter, ft³

t_1 = Temperature of the gas in the wet test meter, °F.

t_2 = Temperature of the inlet gas of the dry gas meter, °F.

t_3 = Temperature of the outlet gas of the dry gas meter, °F.

$\bar{t}$ = Average temperature of the gas in the dry gas meter, obtained by the average of t_2 and t_3 , °F.

ΔP = Pressure differential across orifice, in H₂O.

V_1 = Ratio of accuracy of wet test meter to dry gas meter for each run.

$\bar{V}$ = Average ratio of accuracy of wet test meter to dry gas meter for all three runs;

tolerance = pretest $V \pm 0.05V$

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

Summit Association, Inc.
125 Third Avenue Street
Pittsburgh, PA 15201

PITOT TUBE CALIBRATION DATA

Calibration pitot tube: type 5222 size (OD) .222 ID number 4222

Type S pitot tube ID number 4222 $C_p(\text{std}) = \underline{0.99}$

Calibration: date 11/11/22 performed by 4222

A - Side Calibration

Δp_{std} cm H ₂ O (in. H ₂ O)	Δp_u cm H ₂ O (in. H ₂ O)	$C_p(S)$	DEV.
1.11	1.11	0.99	0.002
1.22	1.22	0.99	0.002
1.33	1.33	0.99	0.002
1.44	1.44	0.99	0.002
1.55	1.55	0.99	0.002
1.66	1.66	0.99	0.002
1.77	1.77	0.99	0.002
1.88	1.88	0.99	0.002
1.99	1.99	0.99	0.002
2.10	2.10	0.99	0.002
2.21	2.21	0.99	0.002
2.32	2.32	0.99	0.002
2.43	2.43	0.99	0.002
2.54	2.54	0.99	0.002
2.65	2.65	0.99	0.002
2.76	2.76	0.99	0.002
2.87	2.87	0.99	0.002
2.98	2.98	0.99	0.002
3.09	3.09	0.99	0.002
3.20	3.20	0.99	0.002
3.31	3.31	0.99	0.002
3.42	3.42	0.99	0.002
3.53	3.53	0.99	0.002
3.64	3.64	0.99	0.002
3.75	3.75	0.99	0.002
3.86	3.86	0.99	0.002
3.97	3.97	0.99	0.002
4.08	4.08	0.99	0.002
4.19	4.19	0.99	0.002
4.30	4.30	0.99	0.002
4.41	4.41	0.99	0.002
4.52	4.52	0.99	0.002
4.63	4.63	0.99	0.002
4.74	4.74	0.99	0.002
4.85	4.85	0.99	0.002
4.96	4.96	0.99	0.002
5.07	5.07	0.99	0.002
5.18	5.18	0.99	0.002
5.29	5.29	0.99	0.002
5.40	5.40	0.99	0.002
5.51	5.51	0.99	0.002
5.62	5.62	0.99	0.002
5.73	5.73	0.99	0.002
5.84	5.84	0.99	0.002
5.95	5.95	0.99	0.002
6.06	6.06	0.99	0.002
6.17	6.17	0.99	0.002
6.28	6.28	0.99	0.002
6.39	6.39	0.99	0.002
6.50	6.50	0.99	0.002
6.61	6.61	0.99	0.002
6.72	6.72	0.99	0.002
6.83	6.83	0.99	0.002
6.94	6.94	0.99	0.002
7.05	7.05	0.99	0.002
7.16	7.16	0.99	0.002
7.27	7.27	0.99	0.002
7.38	7.38	0.99	0.002
7.49	7.49	0.99	0.002
7.60	7.60	0.99	0.002
7.71	7.71	0.99	0.002
7.82	7.82	0.99	0.002
7.93	7.93	0.99	0.002
8.04	8.04	0.99	0.002
8.15	8.15	0.99	0.002
8.26	8.26	0.99	0.002
8.37	8.37	0.99	0.002
8.48	8.48	0.99	0.002
8.59	8.59	0.99	0.002
8.70	8.70	0.99	0.002
8.81	8.81	0.99	0.002
8.92	8.92	0.99	0.002
9.03	9.03	0.99	0.002
9.14	9.14	0.99	0.002
9.25	9.25	0.99	0.002
9.36	9.36	0.99	0.002
9.47	9.47	0.99	0.002
9.58	9.58	0.99	0.002
9.69	9.69	0.99	0.002
9.80	9.80	0.99	0.002
9.91	9.91	0.99	0.002
10.02	10.02	0.99	0.002
10.13	10.13	0.99	0.002
10.24	10.24	0.99	0.002
10.35	10.35	0.99	0.002
10.46	10.46	0.99	0.002
10.57	10.57	0.99	0.002
10.68	10.68	0.99	0.002
10.79	10.79	0.99	0.002
10.90	10.90	0.99	0.002
11.01	11.01	0.99	0.002
11.12	11.12	0.99	0.002
11.23	11.23	0.99	0.002
11.34	11.34	0.99	0.002
11.45	11.45	0.99	0.002
11.56	11.56	0.99	0.002
11.67	11.67	0.99	0.002
11.78	11.78	0.99	0.002
11.89	11.89	0.99	0.002
12.00	12.00	0.99	0.002
12.11	12.11	0.99	0.002
12.22	12.22	0.99	0.002
12.33	12.33	0.99	0.002
12.44	12.44	0.99	0.002
12.55	12.55	0.99	0.002
12.66	12.66	0.99	0.002
12.77	12.77	0.99	0.002
12.88	12.88	0.99	0.002
12.99	12.99	0.99	0.002
13.10	13.10	0.99	0.002
13.21	13.21	0.99	0.002
13.32	13.32	0.99	0.002
13.43	13.43	0.99	0.002
13.54	13.54	0.99	0.002
13.65	13.65	0.99	0.002
13.76	13.76	0.99	0.002
13.87	13.87	0.99	0.002
13.98	13.98	0.99	0.002
14.09	14.09	0.99	0.002
14.20	14.20	0.99	0.002
14.31	14.31	0.99	0.002
14.42	14.42	0.99	0.002
14.53	14.53	0.99	0.002
14.64	14.64	0.99	0.002
14.75	14.75	0.99	0.002
14.86	14.86	0.99	0.002
14.97	14.97	0.99	0.002
15.08	15.08	0.99	0.002
15.19	15.19	0.99	0.002
15.30	15.30	0.99	0.002
15.41	15.41	0.99	0.002
15.52	15.52	0.99	0.002
15.63	15.63	0.99	0.002
15.74	15.74	0.99	0.002
15.85	15.85	0.99	0.002
15.96	15.96	0.99	0.002
16.07	16.07	0.99	0.002
16.18	16.18	0.99	0.002
16.29	16.29	0.99	0.002
16.40	16.40	0.99	0.002
16.51	16.51	0.99	0.002
16.62	16.62	0.99	0.002
16.73	16.73	0.99	0.002
16.84	16.84	0.99	0.002
16.95	16.95	0.99	0.002
17.06	17.06	0.99	0.002
17.17	17.17	0.99	0.002
17.28	17.28	0.99	0.002
17.39	17.39	0.99	0.002
17.50	17.50	0.99	0.002
17.61	17.61	0.99	0.002
17.72	17.72	0.99	0.002
17.83	17.83	0.99	0.002
17.94	17.94	0.99	0.002
18.05	18.05	0.99	0.002
18.16	18.16	0.99	0.002
18.27	18.27	0.99	0.002
18.38	18.38	0.99	0.002
18.49	18.49	0.99	0.002
18.60	18.60	0.99	0.002
18.71	18.71	0.99	0.002
18.82	18.82	0.99	0.002
18.93	18.93	0.99	0.002
19.04	19.04	0.99	0.002
19.15	19.15	0.99	0.002
19.26	19.26	0.99	0.002
19.37	19.37	0.99	0.002
19.48	19.48	0.99	0.002
19.59	19.59	0.99	0.002
19.70	19.70	0.99	0.002
19.81	19.81	0.99	0.002
19.92	19.92	0.99	0.002
20.03	20.03	0.99	0.002
20.14	20.14	0.99	0.002
20.25	20.25	0.99	0.002
20.36	20.36	0.99	0.002
20.47	20.47	0.99	0.002
20.58	20.58	0.99	0.002
20.69	20.69	0.99	0.002
20.80	20.80	0.99	0.002
20.91	20.91	0.99	0.002
21.02	21.02	0.99	0.002
21.13	21.13	0.99	0.002
21.24	21.24	0.99	0.002
21.35	21.35	0.99	0.002
21.46	21.46	0.99	0.002
21.57	21.57	0.99	0.002
21.68	21.68	0.99	0.002
21.79	21.79	0.99	0.002
21.90	21.90	0.99	0.002
22.01	22.01	0.99	0.002
22.12	22.12	0.99	0.002
22.23	22.23	0.99	0.002
22.34	22.34	0.99	0.002
22.45	22.45	0.99	0.002
22.56	22.56	0.99	0.002
22.67	22.67	0.99	0.002
22.78	22.78	0.99	0.002
22.89	22.89	0.99	0.002
23.00	23.00	0.99	0.002
23.11	23.11	0.99	0.002
23.22	23.22	0.99	0.002
23.33	23.33	0.99	0.002
23.44	23.44	0.99	0.002
23.55	23.55	0.99	0.002
23.66	23.66	0.99	0.002
23.77	23.77	0.99	0.002
23.88	23.88	0.99	0.002
23.99	23.99	0.99	0.002
24.10	24.10	0.99	0.002
24.21	24.21	0.99	0.002
24.32	24.32	0.99	0.002
24.43	24.43	0.99	0.002
24.54	24.54	0.99	0.002
24.65	24.65	0.99	0.002
24.76	24.76	0.99	0.002
24.87	24.87	0.99	0.002
24.98	24.98	0.99	0.002
25.09	25.09	0.99	0.002
25.20	25.20	0.99	0.002
25.31	25.31	0.99	0.002
25.42	25.42	0.99	0.002
25.53	25.53	0.99	0.002
25.64	25.64	0.99	0.002
25.75	25.75	0.99	0.002
25.86	25.86	0.99	0.002
25.97	25.97	0.99	0.002
26.08	26.08	0.99	0.002
26.19	26.19	0.99	0.002
26.30	26.30	0.99	0.002
26.41	26.41	0.99	0.002
26.52	26.52	0.99	0.002
26.63	26.63	0.99	0.002
26.74	26.74	0.99	0.002
26.85	26.85	0.99	0.002
26.96	26.96	0.99	0.002
27.07	27.07	0.99	0.002
27.18	27.18	0.99	0.002
27.29	27.29	0.99	0.002
27.40	27.40	0.99	0.002
27.51	27.51	0.99	0.002
27.62	27.62	0.99	0.002
27.73	27.73	0.99	0.002
27.84	27.84	0.99	0.002
27.95	27.95	0.99	0.002
28.06	28.06	0.99	0.002
28.17	28.17	0.99	0.002
28.28	28.28	0.99	0.002
28.39	28.39	0.99	0.002
28.50	28.50	0.99	0.002
28.61	28.61	0.99	0.002
28.72	28.72	0.99	0.002
28.83	28.83	0.99	0.002
28.94	28.94	0.99	0.002
29.05	29.05	0.99	0.002
29.16	29.16	0.99	0.002
29.27	29.27	0.99	0.002
29.38	29.38	0.99	0.002
29.49	29.49	0.99	0.002
29.60	29.60	0.99	0.002
29.71	29.71	0.99	0.002
29.82	29.82	0.99	0.002
29.93	29.93	0.99	0.002
30.04	30.04	0.99	0.002
30.15	30.15	0.99	0.002
30.26	30.26	0.99	0.002
30.37	30.37	0.99	0.002
30.48	30.48	0.99	0.002
30.59	30.59	0.99	0.002
30.70	30.70	0.99	0.002
30.81	30.81	0.99	0.002
30.92	30.92	0.99	0.002
31.03	31.03	0.99	0.002
31.14	31.14	0.99	0.002
31.25	31.25	0.99	0.0

HEMBON ASSOCIATES, INC. Particulate Field Data Sheet

Plant City State Operator
 Location Test no.
 Stack diam. Decicant no. Filter no.
 Picot Picot Hecarbox Hecarbox Hour Month
 coeff. number number Gal (V) Flow T.D.

Trav. point no.	Velocity (ft/min)	Temp. (deg F)	Orifice (in)		Clock time	Sample time	Vacuum (in Hg)	Meter reading (cu. ft.)	Meter temperature (deg F)		Temperature (deg F)	
			Uncorr.	Corr. for point					In	Out	Probe	Filter box
			In. (120)	In. (120)								
Init				Factor (1.25)	7:50	0		5.52			62.3	
1	105	53.2		0.9	7:55	5	1.0	5.51	67	58	64.1	
2	110	53.4		0.95	8:00	10	1.0	5.52	70	57	64.7	
3	115	53.2		1.0	8:05	15	1.0	5.51	70	58	63.5	
4	120	53.7		1.1	8:10	20	1.1	5.44	69	60	63.9	
5	125	53.5		1.15	8:15	25	1.1	5.44	69	61	63.7	
6	130	53.2		1.2	8:20	30	1.2	5.42	69	61	62.7	
7	140	53.2		1.2	8:25	35	1.2	5.42	69	63	64.5	
8	145	53.4		1.15	8:30	40	1.1	5.43	69	63	64.1	
9	150	53.8		1.1	8:35	45	1.1	5.42	69	64	63.9	
10	155	53.6		1.0	8:40	50	1.0	5.53	69	64	64.7	
11	160	53.1		0.9	8:45	55	1.0	5.55	70	64	64.1	
12	165	53.1		0.9	8:50	00	1.0	5.54	70	64	63.7	
13	170	53.0		1.0	8:55	05	1.0	5.53	71	64	63.7	

Ambient temp. °F

Bar. Press. 29.22 in. Hg

Bar. Press. 29.22 in. Hg

IMPINGER WATER
Final 222 ml

Init. ml

Cond. ml

DESICCANT
Final gms

Init. gms

Gain gms

Time
CO₂
CO

ORSAT ANALYSE

Time	<u> </u>	<u> </u>	<u> </u>
CO ₂	<u> </u>	<u> </u>	<u> </u>
CO	<u> </u>	<u> </u>	<u> </u>

79.5

Final leak rate 2.22 cfm at in. Hg

HEMEON ASSOCIATES, INC. Particulate Field Data Sheet

Plant City Operator
 Location Trace No.
 Stack diam. Sample no. Filter no.
 Picot no. Picot no. Number (Col. Y) Date I.D.

Trav. point no.	Velocity Head (A.P.)	Gas Comp.	Orifice Δ H		Clock time	Sample time,	Vacuum,	Water read-log	Inlet Temperature		Temperature	
			Uncorr.	Corr. for molec. Factor					In	Out	Probe	Filter box
Int.	sec	sec	sec	(2.5)	sec	min	° Hg	in. H ₂ O	° F	° C	° F	° C
1	122	519		0.85	8:00	15	110	11.5	29	0.4	12.5	
2	125	521		0.9	8:05	20	110	11.5	29	0.4	12.5	
3	125	522		0.9	8:10	25	110	11.5	29	0.4	12.5	
4	125	527		1.15	8:15	30	110	11.5	29	0.4	12.5	
5	125	530		1.15	8:20	35	110	11.5	29	0.4	12.5	
6	126	537		1.2	8:25	40	110	11.5	29	0.4	12.5	
7	125	544		1.15	8:30	45	110	11.5	29	0.4	12.5	
8	125	547		1.10	8:35	50	110	11.5	29	0.4	12.5	
9	125	550		1.10	8:40	55	110	11.5	29	0.4	12.5	
10	126	559		0.95	8:45	60	110	11.5	29	0.4	12.5	
11	126	565		0.95	8:50	65	110	11.5	29	0.4	12.5	
12	125	575		0.9	8:55	70	110	11.5	29	0.4	12.5	
13	125	585		0.9	9:00	75	110	11.5	29	0.4	12.5	
14	125	595		0.9	9:05	80	110	11.5	29	0.4	12.5	
15	125	605		0.9	9:10	85	110	11.5	29	0.4	12.5	
16	125	615		0.9	9:15	90	110	11.5	29	0.4	12.5	
17	125	625		0.9	9:20	95	110	11.5	29	0.4	12.5	
18	125	635		0.9	9:25	100	110	11.5	29	0.4	12.5	
19	125	645		0.9	9:30	105	110	11.5	29	0.4	12.5	
20	125	655		0.9	9:35	110	110	11.5	29	0.4	12.5	
21	125	665		0.9	9:40	115	110	11.5	29	0.4	12.5	
22	125	675		0.9	9:45	120	110	11.5	29	0.4	12.5	
23	125	685		0.9	9:50	125	110	11.5	29	0.4	12.5	
24	125	695		0.9	9:55	130	110	11.5	29	0.4	12.5	
25	125	705		0.9	10:00	135	110	11.5	29	0.4	12.5	
26	125	715		0.9	10:05	140	110	11.5	29	0.4	12.5	
27	125	725		0.9	10:10	145	110	11.5	29	0.4	12.5	
28	125	735		0.9	10:15	150	110	11.5	29	0.4	12.5	
29	125	745		0.9	10:20	155	110	11.5	29	0.4	12.5	
30	125	755		0.9	10:25	160	110	11.5	29	0.4	12.5	
31	125	765		0.9	10:30	165	110	11.5	29	0.4	12.5	
32	125	775		0.9	10:35	170	110	11.5	29	0.4	12.5	
33	125	785		0.9	10:40	175	110	11.5	29	0.4	12.5	
34	125	795		0.9	10:45	180	110	11.5	29	0.4	12.5	
35	125	805		0.9	10:50	185	110	11.5	29	0.4	12.5	
36	125	815		0.9	10:55	190	110	11.5	29	0.4	12.5	
37	125	825		0.9	11:00	195	110	11.5	29	0.4	12.5	
38	125	835		0.9	11:05	200	110	11.5	29	0.4	12.5	
39	125	845		0.9	11:10	205	110	11.5	29	0.4	12.5	
40	125	855		0.9	11:15	210	110	11.5	29	0.4	12.5	
41	125	865		0.9	11:20	215	110	11.5	29	0.4	12.5	
42	125	875		0.9	11:25	220	110	11.5	29	0.4	12.5	
43	125	885		0.9	11:30	225	110	11.5	29	0.4	12.5	
44	125	895		0.9	11:35	230	110	11.5	29	0.4	12.5	
45	125	905		0.9	11:40	235	110	11.5	29	0.4	12.5	
46	125	915		0.9	11:45	240	110	11.5	29	0.4	12.5	
47	125	925		0.9	11:50	245	110	11.5	29	0.4	12.5	
48	125	935		0.9	11:55	250	110	11.5	29	0.4	12.5	
49	125	945		0.9	12:00	255	110	11.5	29	0.4	12.5	
50	125	955		0.9	12:05	260	110	11.5	29	0.4	12.5	
51	125	965		0.9	12:10	265	110	11.5	29	0.4	12.5	
52	125	975		0.9	12:15	270	110	11.5	29	0.4	12.5	
53	125	985		0.9	12:20	275	110	11.5	29	0.4	12.5	
54	125	995		0.9	12:25	280	110	11.5	29	0.4	12.5	
55	125	1005		0.9	12:30	285	110	11.5	29	0.4	12.5	
56	125	1015		0.9	12:35	290	110	11.5	29	0.4	12.5	
57	125	1025		0.9	12:40	295	110	11.5	29	0.4	12.5	
58	125	1035		0.9	12:45	300	110	11.5	29	0.4	12.5	
59	125	1045		0.9	12:50	305	110	11.5	29	0.4	12.5	
60	125	1055		0.9	12:55	310	110	11.5	29	0.4	12.5	
61	125	1065		0.9	1:00	315	110	11.5	29	0.4	12.5	
62	125	1075		0.9	1:05	320	110	11.5	29	0.4	12.5	
63	125	1085		0.9	1:10	325	110	11.5	29	0.4	12.5	
64	125	1095		0.9	1:15	330	110	11.5	29	0.4	12.5	
65	125	1105		0.9	1:20	335	110	11.5	29	0.4	12.5	
66	125	1115		0.9	1:25	340	110	11.5	29	0.4	12.5	
67	125	1125		0.9	1:30	345	110	11.5	29	0.4	12.5	
68	125	1135		0.9	1:35	350	110	11.5	29	0.4	12.5	
69	125	1145		0.9	1:40	355	110	11.5	29	0.4	12.5	
70	125	1155		0.9	1:45	360	110	11.5	29	0.4	12.5	
71	125	1165		0.9	1:50	365	110	11.5	29	0.4	12.5	
72	125	1175		0.9	1:55	370	110	11.5	29	0.4	12.5	
73	125	1185		0.9	2:00	375	110	11.5	29	0.4	12.5	
74	125	1195		0.9	2:05	380	110	11.5	29	0.4	12.5	
75	125	1205		0.9	2:10	385	110	11.5	29	0.4	12.5	
76	125	1215		0.9	2:15	390	110	11.5	29	0.4	12.5	
77	125	1225		0.9	2:20	395	110	11.5	29	0.4	12.5	
78	125	1235		0.9	2:25	400	110	11.5	29	0.4	12.5	
79	125	1245		0.9	2:30	405	110	11.5	29	0.4	12.5	
80	125	1255		0.9	2:35	410	110	11.5	29	0.4	12.5	
81	125	1265		0.9	2:40	415	110	11.5	29	0.4	12.5	
82	125	1275		0.9	2:45	420	110	11.5	29	0.4	12.5	
83	125	1285		0.9	2:50	425	110	11.5	29	0.4	12.5	
84	125	1295		0.9	2:55	430	110	11.5	29	0.4	12.5	
85	125	1305		0.9	3:00	435	110	11.5	29	0.4	12.5	
86	125	1315		0.9	3:05	440	110	11.5	29	0.4	12.5	
87	125	1325		0.9	3:10	445	110	11.5	29	0.4	12.5	
88	125	1335		0.9	3:15	450	110	11.5	29	0.4	12.5	
89	125	1345		0.9	3:20	455	110	11.5	29	0.4	12.5	
90	125	1355		0.9	3:25	460	110	11.5	29	0.4	12.5	
91	125	1365		0.9	3:30	465	110	11.5	29	0.4	12.5	
92	125	1375		0.9	3:35	470	110	11.5	29	0.4	12.5	
93	125	1385		0.9	3:40	475	110	11.5	29	0.4	12.5	
94	125	1395		0.9	3:45	480	110	11.5	29	0.4	12.5	
95	125	1405		0.9	3:50	485	110	11.5	29	0.4	12.5	
96	125	1415		0.9	3:55	490	110	11.5	29	0.4	12.5	
97	125	1425		0.9	4:00	495	110	11.5	29	0.4	12.5	
98	125	1435		0.9	4:05	500	110	11.5	29	0.4	12.5	
99	125	1445		0.9	4:10	505	110	11.5	29	0.4	12.5	
100	125	1455		0.9	4:15	510	110	11.5	29	0.4	12.5	

HIDECOR ASSOCIATES, INC. Particulate Field Data Sheet

Place: St. Louis City: St. Louis Operator: W. J. H. H.
 Location: St. Louis Plot no.: 100 Date: 10/10/68
 Stack diam.: 12.5 Discharge no.: 100 Filter no.: 100
 Piter: 100 Piter: 100 Meterbox: 100 Meterbox: 100
 Conf.: 100 number: 100 Cal(Y): 100 Diam.: 100 T.D.: 100

Trav. point no.	Volos-ity (ft./min.)	Temp. (°F)	Gravimetric		Clock time	Sample time	Vacuum (in. Hg)	Meter reading (in. Hg)	Meter temperature (°F)		Temperature (°F)	
			Uncorr.	Corr.					In	Out	Probe	Filter box
Ente	300			Factor (2.5)	10:05	0	100	100	100	100	100	100
1	100	525		100	10:00	5	100	100	100	100	100	100
2	100	525		100	10:05	10	100	100	100	100	100	100
3	100	525		100	10:10	15	100	100	100	100	100	100
4	100	525		100	10:15	20	100	100	100	100	100	100
5	100	525		100	10:20	25	100	100	100	100	100	100
6	100	525		100	10:25	30	100	100	100	100	100	100
7	100	525		100	10:30	35	100	100	100	100	100	100
8	100	525		100	10:35	40	100	100	100	100	100	100
9	100	525		100	10:40	45	100	100	100	100	100	100
10	100	525		100	10:45	50	100	100	100	100	100	100
11	100	525		100	10:50	55	100	100	100	100	100	100
12	100	525		100	10:55	60	100	100	100	100	100	100
13	100	525		100	11:00	65	100	100	100	100	100	100
14	100	525		100	11:05	70	100	100	100	100	100	100
15	100	525		100	11:10	75	100	100	100	100	100	100
16	100	525		100	11:15	80	100	100	100	100	100	100
17	100	525		100	11:20	85	100	100	100	100	100	100
18	100	525		100	11:25	90	100	100	100	100	100	100
19	100	525		100	11:30	95	100	100	100	100	100	100
20	100	525		100	11:35	100	100	100	100	100	100	100
Summary	100	525		100								

Ambient Temp. 78°F IMPINGER WATER Final 100 ml DESTICANT Final 100 ml
 Bar. Press. 100 in. HG Int. 100 ml Ent. 100 ml
 Stat. Press. 100 in. HG Cond. 100 ml Gain 100 gms

Pilot leak rate 100 cfm at 100 in. Hg

WEMCO ASSOCIATES, INC. Particulate Field Data Sheet

Plant 2222 City 2222 Operator 2222
 Location 2222 Plant no. 2222
 Stack diam. 2222 No. 2222
 Pitter 2222 Motorbox 2222 Motorbox 2222
 Conf. 2222 number 2222 number 2222 Dia. 2222 L.D. 2222

Trav. point no.	Velocity (ft./min.)	Temp. (°F)	Orifice Uncorr. (in. (H ₂ O))	Orifice Corr. (in. (H ₂ O))	Clock time	Sample time (min)	Vacuum (in. Hg)	Motor reading (cu. ft.)	Motor temperature (°F) In Out	Temp of Coriolis Probe	Filter box
Indc	Indc		Indc	Factor (2)			Indc		Indc Indc		
1	95	250		0.45	3:20	0	12.0	0.25	80 80	125	
2	95	252		0.45	3:30	10	12.0	0.25	80 80	125	
3	100	251		0.70	3:40	15	12.0	0.25	80 80	125	
4	100	221		0.80	3:50	20	12.0	0.25	80 80	125	
5	105	221		0.85	4:00	25	12.0	0.25	80 80	125	
6	105	225		0.85	4:10	30	12.0	0.25	80 80	125	
7	105	229		0.85	4:25	35	12.0	0.25	80 80	125	
8	105	232		0.85	4:40	40	12.0	0.25	80 80	125	
9	105	229		0.25	4:55	45	12.0	0.25	80 80	125	
10	110	235		0.25	5:10	50	12.0	0.25	80 80	125	
11	105	223		0.70	5:25	55	12.0	0.25	80 80	125	
12	105	227		0.25	5:40	60	12.0	0.25	80 80	125	
Station 15	110	778		748		120	10.70	0.25	80 76		

Ambient Temp. 22 °F
 Bar. Press. 22.22 in. Hg
 Bar. Press. 22.22 in. Hg
 Impinger Water Final 55 ml
 Indc. 100 ml
 Cond. 55 ml
 Desiccant Final 22.22 gms
 Indc. 22.22 gms
 Gain 22.22 gms
 Time 22.22
 CO 22.22
 O₂ 22.22
 CO 22.22

Final leak rate 2.22 cfm at 22.22 in. Hg N₂ - 778

HEMEON ASSOCIATES, INC.
Particulate Field Data Sheet

Plant 203500 City 203500 Operator 203500
 Location 203500 Trace No. 203500
 Bench diam. 203500 Desiccant no. 203500 Filter no. 203500
 Pitot coeff. 203500 Pitot no. 203500 Meter box 203500 No. 203500
 number 203500 (Cal. (Y)) 203500 Diam. 203500 I.D. 203500

Trav. point no.	Veloc. (ft./min.)	Bar. (in. Hg.)	Orifice Δ H (in. H ₂ O)	Orifice Δ H (in. H ₂ O)	Clock time	Sample time, min	Vac. (in. Hg.)	Meter reading	Meter Temperature (Deg. F)	Temperature (Deg. F)	Temp. (Deg. F)	Temp. (Deg. F)
1	105	274	0.20	0.20	4:40	15	1.10	20.5	20	20	20	20
2	115	277	0.25	0.25	4:45	20	1.12	20.5	20	20	20	20
3	115	281	0.25	0.25	4:50	25	1.10	20.5	20	20	20	20
4	140	282	0.30	0.30	4:55	30	1.10	20.5	20	20	20	20
5	140	282	0.30	0.30	5:00	35	1.10	20.5	20	20	20	20
6	115	285	0.25	0.25	5:05	40	1.10	20.5	20	20	20	20
7	115	289	0.25	0.25	5:10	45	1.10	20.5	20	20	20	20
8	115	285	0.25	0.25	5:15	100	1.10	20.5	20	20	20	20
9	110	282	0.25	0.25	5:20	105	1.10	20.5	20	20	20	20
10	110	289	0.25	0.25	5:25	110	1.10	20.5	20	20	20	20
11	95	279	0.15	0.15	5:30	115	1.10	20.5	20	20	20	20
12	95	274	0.15	0.15	5:35	120	1.10	20.5	20	20	20	20

Homon Association, Inc. report of 4/18/90
to Honco, Inc., Cleveland, Ohio

D. Laboratory Data

SAMPLE WEIGHTS AND HCN CONCENTRATIONS

Test No.	1	2	3
Test Date	4/10/90	4/10/90	4/10/90
Impinger Solution, mg	.97	.02	0
Silica Gel, mg	0	0	0
Total HCN, mg	.97	.02	0
Sample Gas Volume scf	48.5	36.5	57.7
Sample Gas Weight, lbs	5.14	2.59	4.33
PM Conc., 0/1000000 dgas	.417	.010	0
PM Conc., gr/1000 dscf	.219	.009	0

TABLE I
RESULTS ON CYANIDE ANALYSIS
HEMPHON ASSOCIATES, INC.
125 THIRTY-NINTH STREET
PITTSBURGH, PA. 15201
PURCHASE ORDER #2890 - TOBECO
SAMPLES RECEIVED: APRIL 11, 1990

SAMPLE I. D.	AQS LABORATORY NUMBER	SAMPLE TYPE	TOTAL VOLUME ml	TOTAL CYANIDE FOUND MICROGRAMS
7235	53691	LIQUID	420	0.98
7236	53692	LIQUID	450	0.03
7237	53693	LIQUID	500	0.01
7238	53694	LIQUID	480	0.01
7239	53695	SILICA GEL		<0.01
7240	53696	SILICA GEL		<0.01
7241	53697	SILICA GEL		<0.01
7242	53698	SILICA GEL		<0.01

THE SAMPLES WERE ANALYZED BY SPECIFIC ION ELECTRODE.